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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/380,864	12/02/1999	MARTYN VINCENT TWIGG	JMYT-V00200	3166

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EXAMINER

LEUNG, JENNIFER A

ART UNIT	PAPER NUMBER
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1764

DATE MAILED: 09/16/2003

15

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

09/380,864

Applicant(s)

TWIGG, MARTYN VINCENT

Examiner

Jennifer A. Leung

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-- The MAILING DATE of this communication appears on the cover sheet with the corresponding address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 9-19 and 21-35 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 9-19 and 21-35 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on July 11, 2003 has been entered.

Response to Amendment

2. Applicant's after final response submitted April 14, 2003 and the preliminary amendment submitted July 11, 2003 have been received and carefully considered. Claims 1-8 and 20 are cancelled. Claims 34 and 35 have been added. Claims 9-19 and 21-35 remain active.

Claim Objections

3. Claim 13 is objected to under 37 CFR 1.75 as being a substantial duplicate of claim 12. When two claims in an application are duplicates, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 17 and 31 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contain subject matter which was not

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described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. Although the written description discloses, "the first catalyst system provides a low space velocity," and "[a] lower space velocity may be achieved readily in practice by increasing the volume of the catalyst," (page 2, line 30 to page 3, line 2), it is unclear as to where the specifically claimed limitation of, "a substrate coated with the lean NOx catalyst is at least 150% that of the oxidation catalyst" is disclosed in the specification.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 29 and 30 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 29, "the lean NOx catalyst system" lacks proper positive antecedent basis. Additionally, -- exhaust -- should be inserted before "gases" (line 1), as it is unclear as to which gases (set forth in claim 21) the claim is directed.

Regarding claim 30, -- product -- should be inserted before "gases" (line 1), as it is unclear as to which gases (set forth in claim 21) the claim is directed.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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6. Claims 9, 12-14, 16, 21, 24-26, 28, 34 and 35 are rejected under 35 U.S.C. 102(b) as being anticipated by Haensel (U.S. 3,503,715).

Regarding claims 9, 14 and 34, Haensel discloses an emission control system comprising:

- a) an upstream catalyst **A** comprising a platinum group metal, a.k.a. PGM, wherein the PGM may consist of platinum (column 2, line 52 to column 3, line 15; Examples I-XI), present at a loading of $\leq 30 \text{ g/ft}^3$ (specifically, “an amount of from about 0.05 to about 2.0 troy ounces per cubic foot of carrier material, or within the range of from about .01% to about 1.0% platinum, by weight of the composite,” column 5, line 63 to column 6, line 5); and
- b) a downstream catalyst **B** comprising a PGM, wherein the PGM may also comprise platinum, (column 2, line 52 to column 3, line 15).

Catalyst **A** inherently functions as a lean NO_x catalyst, since catalyst **A**, “is adapted to accommodate a lower temperature, low emission engine exhaust gases and effect a high degree of conversion.” Additionally, catalyst **B** inherently functions as an oxidation catalyst, since catalyst **B** is, “particularly adaptable for use in contacting high temperature exhaust gas streams from high emission engines.” (column 10, lines 5-24; see also column 2, lines 6-27).

Regarding claims 12 and 13, Haensel discloses upstream catalyst **A** may further comprise an alkaline earth metal, such as calcium, strontium and barium (specifically, “*at least one portion* of the mixed catalyst bed shall contain an added component of an alkaline earth metal group oxide,” column 10, lines 58-66; see also column 3, lines 15-45).

Regarding claim 16, Haensel discloses downstream catalyst **B** or upstream catalyst **A** may further comprise, “a suitable refractory inorganic oxide carrier material such as aluminum oxide or an oxide of one or more of the following: zirconium, titanium, hafnium and silicon, or

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alternatively, such metal oxides compounds with aluminum oxide as the principal base component,” (column 2, line 70 to column 3, line 5).

Regarding claims 21 and 26, Haensel discloses a corresponding process for controlling the emissions from an internal combustion engine, employing the system disclosed in claim 9 above, wherein the exhaust gases are introduced through an inlet port **2**, passing over catalyst **A** and subsequently, catalyst **B** (Figure; column 9, line 71 to column 10, line 4). Haensel discloses, “the unitary device, as shown, is thus capable of handling exhaust gases from *any kind of vehicle engine*, or from an engine which may change from being a low emission engine to a high emission engine,” (column 10, lines 5-24) and therefore, the process may be used specifically to control the emissions from a lean-burn engine (see also column 1, lines 51-63).

Regarding claim 24, Haensel discloses upstream catalyst **A** may further comprise an alkaline earth metal, such as calcium, strontium and barium (specifically, “*at least one portion of the mixed catalyst bed shall contain an added component of an alkaline earth metal group oxide*,” column 10, lines 58-66; see also column 3, lines 15-45).

Regarding claim 25, Haensel discloses downstream catalyst **B** may further comprise a base metal, such as iron, nickel, copper, silver or gold (column 2, lines 42-70).

Regarding claim 28, Haensel discloses downstream catalyst **B** or upstream catalyst **A** may further comprise, “a suitable refractory inorganic oxide carrier material such as aluminum oxide or an oxide of one or more of the following: zirconium, titanium, hafnium and silicon, or alternatively, such metal oxides compounds with aluminum oxide as the principal base component,” (column 2, line 70 to column 3, line 5).

Regarding claim 35, Haensel discloses the emission control system, as disclosed in claim

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34 above, may be used in combination with “any kind of vehicle engine, or... an engine which may change from being a low emission engine to a high emission engine,” (column 10, lines 5-24), or specifically, diesel engines and gasoline engines with low quantities of unburned hydrocarbons and carbon monoxide (column 1, lines 26-63; column 2, lines 5-33).

Instant claims 9, 12-14, 16, 21, 24-26, 28, 34 and 35 read on the method and apparatus of Haensel.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

7. Claims 10, 11, 17, 22, 23 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haensel (U.S. 3,503,715).

Regarding claims 10, 11, 22 and 23, Haensel illustrates HC and CO conversion rates for the compositions of Examples I-XI in TABLE I (column 7, line 9 to column 11, line 23), as evaluated under the conditions recited in column 6, lines 33-75. Haensel further discloses, “[a]n inherent result of the small volume of catalyst employed in the test evaluation procedure is that the space velocity of the exhaust gases coming into contact with the catalyst is considerably higher than would be encountered in actual driving conditions. Accordingly, *the percentage conversion obtained during actual use in automotive exhaust gas converters would be considerably higher,*” (column 7, lines 1-7). However, Haensel is silent as the magnitude which constitutes the *considerably higher* conversion, and is further silent as to whether the NO_x catalyst (i.e., catalyst A) has an activity sufficient to provide a ratio of % NO_x conversion to % HC conversion of at least 0.2, or whether the oxidation catalyst (i.e., catalyst B) has an activity

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sufficient to provide a % HC conversion of greater than 80% and a % CO conversion of greater than 70%, as measured under the testing conditions of a temperature of 230 °C, a space velocity of 25,000 hr⁻¹ and a hydrocarbon:NO_x input ratio of 3:1 counting the HC as equivalent propane. In any event, the system and method of Haensel meet the claims, since although the instantly claimed conversion rates for the given testing conditions are not disclosed, a newly discovered property does not necessarily mean the product is unobvious, since this property may be inherent in the prior art. *In re Best* 195 USPQ 430 (CCPA 1977); *In re Swinehart* 169 USPQ 226 (CCPA 1971). The catalyst system disclosed by Haensel comprises substantially the elements of the instantly claimed invention and therefore one of ordinary skill in the art would not expect a different and/or unexpected result to be obtained. Additionally, although applicant's testing conditions are not specifically disclosed in the Haensel reference, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to select an appropriate temperature, space velocity and input ratio for the evaluation on the basis of suitability for the intended use, since what is recited is merely a testing condition, and where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233.

Regarding claims 17 and 31, Haensel discloses, "the low emission catalyst may be provided in a size somewhat larger than the high emission catalyst such the latter automatically will tend to settle during operation. In one instance, such as shown in the accompanying drawing, the low emission catalyst particles A can be made slightly larger than 1/8-inch average diameter and the high temperature resistant high emission particles, containing barium, will be smaller than 1/8-inch average diameter," (column 10, lines 40-57). Although Haensel is silent as

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to the volume of the substrate coated with the lean NO_x catalyst (i.e., catalyst **A**) being at least 150% that of the oxidation catalyst (i.e., catalyst **B**), it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to select such a volume relationship for the substrates in the method and apparatus of Haensel, on the basis of suitability for the intended use, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

8. Claims 15 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haensel (U.S. 3,503,715) in view of Voss et al. (U.S. 5,491,120).

Regarding claims 15 and 27, Haensel discloses that, "with respect to platinum group metals, the platinum will be present in an amount of from about 0.05 to about 2.0 troy ounces per cubic foot of carrier material, or within the range of from about .01% to about 1.0% platinum, by weight of the composite," (column 5, line 63 to column 6, line 5) which is equivalent to about 1.6 to about 62.2 g/ft³ of carrier material. However, Haensel is silent as to the instantly claimed PGM loading of about 100 g/ft³ for the oxidation catalyst (i.e., catalyst **B**). In any event, the specific loading of platinum is not considered to confer patentability to the claim since the precise loading would have been considered a result effective variable by one having ordinary skill in the art. Also, it is noted that the present specification sets forth on page 4, line 20 to page 5, line 12 (i.e., TABLE 1) that the claimed loading, is at best, a preferred limitation. As such, without more, the claimed loading cannot be considered "critical". Accordingly, one having ordinary skill in the art would have routinely optimized the amount of PGM in the system to obtain the desired conversion ratio for a particular component of the exhaust gas stream, *In re*

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Boesch, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980), and since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233. Additionally, Voss et al. teach an oxidation catalyst composition, suitable for oxidizing hydrocarbons and carbon monoxide from diesel engine exhaust, comprising a *conventional* loading of 0.1 to 200 g/ft³ of a PGM, and more preferably, the amount is from 20 to 120 g/ft³ (column 6, line 65 to column 7, line 20; column 9, lines 13-31), in order to promote oxidation of CO and HC gaseous components while reducing the undesirable oxidation of SO₂ to SO₃ (column 6, lines 2-8).

9. Claims 29 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haensel (U.S. 3,503,715) in view of Oliver (U.S. 3,915,896).

Regarding claims 29 and 30, Haensel is silent as to whether the process may be conducted at the instantly claimed space velocity of below 40,000 hr⁻¹ for the NO_x catalyst (i.e., catalyst A) and a space velocity of 40,000 - 80,000 hr⁻¹ for the oxidation catalyst (i.e., catalyst B). In any event, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to select appropriate space velocities for the process of Haensel, on the basis of suitability for intended use, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233. Furthermore, Oliver teaches that the space velocity of a process for controlling the emissions from an internal combustion engine is typically in the range of 10,000 to 300,000 hr⁻¹ for separate reduction or oxidation or combined reduction and oxidation beds, reflective of the range of space velocities generated by an engine driving a vehicle in town conditions (column 7, lines 1-20).

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10. Claims 18 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haensel (U.S. 3,503,715) in view of Fukui et al. (U.S. 5,474,745).

Regarding claims 18 and 32, Haensel is silent as to the lean NO_x catalyst (i.e., catalyst A) being coated on two substrates arranged in parallel. Fukui et al. teach an apparatus for reducing NO_x in exhaust gas from a diesel engine comprising an NO_x reducing catalyst coated on two substrates arranged in parallel (FIG. 15; column 11, lines 34-44). It would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to configure the NO_x catalyst as such in the system and process of Haensel because such arrangement improves the heat release ability of the substrate in comparison to a larger converter, as taught by Fukui et al. "In order to increase the conversion efficiency for reducing NO_x in the exhaust gas... it is important to keep temperatures of the gas and catalyst from increasing by releasing the exothermic heat to the outside immediately," (column 4, lines 3-11).

11. Claims 19 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haensel (U.S. 3,503,715) in view of Abe et al. (EP 0 661 089).

Regarding claims 19 and 33, Haensel discloses that for conventional engines, "secondary or combustion air is injected ahead of the converter inlet usually by means of an aspirator or by a suitable external compressor... to insure reasonably high conversion levels under all conditions of driving," (column 1, line 70 to column 2, line 5). Although Haensel is silent as to whether the means may be used for injecting hydrocarbon fuel, it is well known in the art (as evidenced by Abe et al.) that additional injection of hydrocarbon fuel insures complete reduction of NO_x that is inherently present in the subsequently disclosed "new auto engines", which tend to release "relatively low quantities of unburned hydrocarbons and carbon monoxide as compared with

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engines in older vehicles,” (column 2, lines 5-27). In particular, Abe et al. teach reducing NO_x in an exhaust gas having a lean air-to-fuel ratio wherein at least one reducing agent of hydrocarbons and oxygen-containing organic compounds having at least two carbon atoms, or a fuel containing at least one of the reducing agents, is introduced on an upstream side of the exhaust gas cleaner (page 3, lines 12-21), as the exhaust gas generally does not contain sufficient amounts of residual hydrocarbons to reduce all nitrogen oxides, as taught by Abe et al. (page 6, lines 39-44).

Response to Arguments


12. Applicant's arguments with respect to claims 9-19 and 21-35 have been considered but are moot in view of the new grounds of rejection as necessitated by amendment. The rejections of claims 9, 12-14, 16, 20-21, 24-26 and 28 under 35 U.S.C. 102(b) as being anticipated by Addiego et al. and claims 10, 11, 15, 17-19, 22, 23, 27 and 29-33 under 35 U.S.C. 103(b) as being unpatentable over Addiego et al. (and secondary references) in the Final Office action are withdrawn, as the references are overcome by applicant's amendment to limit the lean NO_x catalyst to comprise a lean NO_x catalyst platinum group metal consisting of platinum only.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is 703-305-4951. The examiner can normally be reached on 8:30 am - 5:30 pm M-F, every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on 703-308-6824. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Jennifer A. Leung
September 10, 2003 


HIEN TRAN
PRIMARY EXAMINER